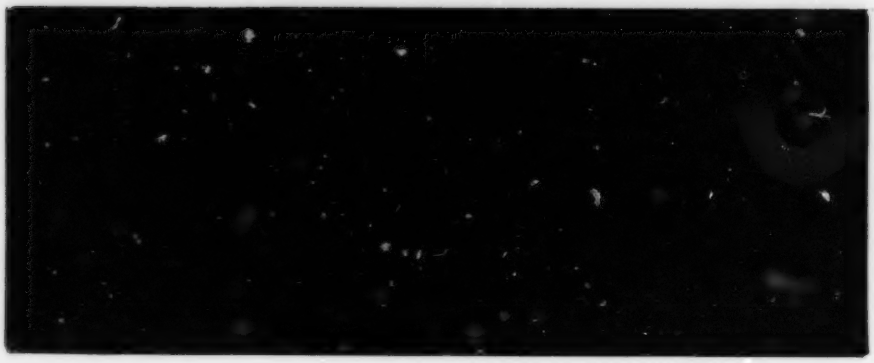
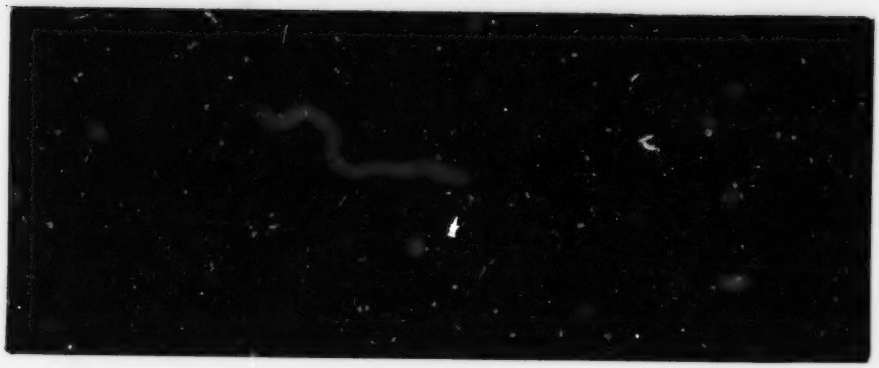
Saskatchewan
Agriculture

# Agriculture Development Fund





91-02573/

Technical/Final Report
to
Saskatchewan Agriculture Development Fund

# Management of Weanling Pigs To Minimize Environmental and Social Stress

R-86-01-0068

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ADF FINAL REPORT, 1986-7

# MANAGEMENT OF WEANLING PIGS TO MINIMIZE ENVIRONMENTAL AND SOCIAL STRESS

## Executive summary

Two sub-projects have been completed. Abstracts and reports are given below. One sub-project concerning grouping weanlings by weight versus grouping by litter has been completed but not analyzed. Another sub-project concerning the effects of heat lamp location is underway.

## Abstracts

### SPACE UTILIZATION BY PIGS IN CONVENTIONAL WEANER DECKS

This behavioral study was conducted to determine how weanling pigs use space in pens of different shapes and sizes. The pigs appeared to prefer to sleep near the feeders rather than in low-traffic areas. However, the choice of resting site was probably prejudiced by the initial location of heat lamps. Manuring did not occur preferentially near the waterers, but took place away from the resting site and in low traffic areas. The space in small decks was used more uniformly than in large wide or large narrow decks and pigs in them initially grew more rapidly.

### EFFECT OF FRESH FEED ON INTAKE OF WEANLING PIGS

This feeding trial was conducted to determine the effect of offering fresh feed daily on post-weaning feed consumption and consequent gain by weanling pigs. The removal of stale feed and its replacement by fresh feed every day did not improve feed consumption or growth rate during the first week, or over all four weeks, of the feeding trial. Pig performance was appreciably better when fed a commercial diet rather than a home mixed one.

## List of papers prepared and talks given

Christison, G.I. and Lewis, N.J. 1987. Space utilization by piglets in conventional weaner decks. Department of Animal & Poultry Science Research Reports, University of Saskatchewan.

De Gooijer, J.A. and Christison, G.I. 1987. The effect of fresh feed on intake of weanling pigs. Department of Animal and Poultry Science Research Reports, University of Saskatchewan.

Christison, G.I. What's new in pork production? Presented at Advanced Pork Production Course, Lloydminster, March 1987.

## Equipment purchased of value in excess of $500.00

None

Summary

THE EFFECT OF FRESH FEED ON INTAKE OF WEANLING PIGS

J.A. de Gooijer and G.I. Christison

A problem producers face with newly weaned pigs is poor feed intake, particularly during the first few days after weaning. Making the starter more attractive should help to get weanling pigs off to a good start. One factor which may be involved is the freshness of the feed. A trial was set up to determine how post-weaning feed consumption and consequent gain of the pigs was affected by replacing the feed in the feeders with fresh material every day. In another experimental group, the feed was stored where the barn odors were stronger and was added to the feeders several days before it was eaten. Fresh and stale rations were offered in two forms: a good commercial crumble and a home-mixed meal of rolled oats and soybean meal.

On a daily basis, intake of fresh feed was variable from litter to litter but both diets were eaten in similar amounts until about 10 days after weaning when a noticeable increase occurred in the amount of commercial diet eaten.

Over the entire test period the commercial diet was eaten in significantly higher quantities than the meal diet. Daily gain and feed efficiency were also both significantly better on the commercial crumble than on the home-mixed feed. There was no indication that freshness played any role in affecting intake or growth.

Although these results show no benefit from providing fresh feed daily, producers should continue to ensure that feeders are not contaminated with urine or manure and that the feed in the feeders is not stale. Although weaners can grow adequately on home-mixed diets, good commercial feeds give higher growth rates and are therefore more economical.

Summary

SPACE UTILIZATION BY PIGS IN CONVENTIONAL WEANER DECKS

G. I. Christison and N.J. Lewis

The high overhead cost of swine housing means that producers have to balance crowding to maximize the use of space versus providing for the best performance and welfare of the animals. The pig's perception of the space within the pen and its consequent behavior governs the adequacy of the available area.

Behavioral studies were conducted to determine how pigs use the area provided in pens of different sizes and shapes and what factors influence such utilization. Manuring patterns, and the effect of stocking density and water position on these patterns, were also studied.

Newly weaned pigs were placed in weaner decks of three shapes which were 4 x 6', 4 x 12' or 8 x 6' in size. In the large decks, pigs were either at the normal stocking density (2.5 $ft^2$ per pig) or at half of that rate. The behavior of the pigs was observed on the day of weaning and morning and afternoon on days 3, 7, 17 and 21 after weaning.

In all pen shapes and at both densities, pigs lay most often near the feeders. The heat lamps were located in this area during the first week and may have caused the pigs to select this area. However, during the following weeks, when there were no lamps, the pigs did not choose to move away from the high-traffic areas between the feeder and the waterer. Piglets consistently manured in the back areas of all pens and away from the high-traffic areas, displaying good discrimination between resting and bathroom sites. Definite patterns for these behaviors were established within two days, indicating that attempts to change behavior must be made as soon as the pigs enter the weaner decks.

Total space available in the small deck was used more uniformly than the space available in the large wide or large narrow decks at normal stocking densities. Stocking density had no effect on manuring patterns, indicating that the recommended stocking density allows for normal bathroom habits. More activities occurred in the front half of all decks, but the back area of the small deck was used more frequently than the back areas of the wide or narrow decks.

Although feed intake and feed efficiency were not related to pen shape, weight gain was. Piglets in small pens gained more rapidly than those in narrow or wide pens during the first two weeks. By the fourth week in the weaner decks, there were no differences in body weight.

Moving the waterer from the back of the long narrow pen to the side near the feeder caused the pigs to stop resting in that area.

Pigs housed in narrow pens drank more often when the waterer was closer to the feeder. Feed consumption also increased. There was no evidence to suggest that piglets manure where water is located when they are housed in weaner decks with totally slatted floors.

Recommendations for deck design can be made from these results. Further studies are needed about heat lamp location and such trials are underway. Attempts to control where pigs lie must be made early because they do not seem to change their preferences once they have made their choice. Putting water near the feeder may create a less disturbed resting site and in some cases could increase feed consumption. Pigs do not manure preferentially near the waterer. Manuring sites will be chosen furthest from the feeding and resting areas.

# SPACE UTILIZATION BY PIGS IN CONVENTIONAL WEANER DECKS

G.I. Christison and N.J. Lewis

## ABSTRACT

This behavioral study was conducted to determine how weanling pigs use space in pens of different shapes and sizes. The pigs appeared to prefer to sleep near the feeders rather than in low traffic areas. However, the choice of resting site was probably prejudiced by the initial location of heat lamps. Manuring did not occur preferentially near the waterers, but took place away from the resting site and in low traffic areas. The space in small decks was used more uniformly than in large wide or large narrow decks and pigs in them initially grew more rapidly.

## BACKGROUND AND OBJECTIVES

The high overhead cost of swine housing has caused an increase in the number of pigs stocked per square meter of floor space. Concerns have been expressed at the same time about the welfare of intensively housed pigs. Available pen space must be used as efficiently as possible without harming the animals. Within the confines of the pen, it is the pigs' behavior and perception of the available space that governs how space is used and consequently the adequacy of the available space.

This behavioral study was conducted to:

1. determine how pigs use the space provided in pens of different sizes and shapes and what factors influence such space utilization,

2. study defecation patterns and determine the effect of stocking density and water position on these patterns, and

3. determine if differences in behavior caused by pen shape, stocking density and water position affected weight gain, feed consumption and feed conversion of weanling pigs.

## EXPERIMENTAL METHODS

Five hundred seventy four (574) pigs weaned at 28 $\pm$ 3 days were placed in weaner decks of three shapes which were 1.2 x 1.8 m, 1.2 x 3.6 m or 2.4 x 1.8 m in size (Figure 1), each constructed of vertical plastic bars and molded plastic floors. Large decks provided 0.48 $m^2$ or 0.24 $m^2$ floor space per pig at the low (8 - 10 pigs) and normal stocking densities (16 - 19 pigs), respectively. Small decks housed 8 to 10 pigs only, providing 0.24 $m^2$ floor space per pig. The standard space allowance of 0.24 $m^2$ is for 18 kg pigs. Pigs in this study weighed less than 18 kg.

Four quadrats in the small deck and 8 in each of the large decks were designated in order to describe the location of the pigs. Feeders

were positioned in quadrat 2 or quadrats 1 plus 2, depending on stocking density. The waterer (one nipple per 9 pigs) was positioned directly opposite the feeder in trial 1 and moved to a location adjacent to the feeder in trial 2. The heat lamp located between quadrats 1 and 2 was present for the first 7 days only (Figure 1).

Behavior of the pigs was observed during the second hour after weaning and on days 3, 7, 17 and 21 of the trial from 0900 h to 1000 h and from 1300 h to 1400 h. Location and activity of each pig was recorded every 10 minutes per observation period. Defecation was recorded as subjective measurements of cleanliness (decreasing on scale of 1 to 5) and buildup (increasing on scale of 1 to 4).

## RESULTS AND DISCUSSION

### Location Preferences

In all pen shapes and at both densities, pigs rested on their chests in sternal recumbency more frequently in quadrats 1 and 2 than in any other quadrats. The feeder was positioned adjacent to or in these quadrats, as was the heat lamp during the first week after weaning. Pigs did not choose to lie out of the high-traffic areas created by movement between the feeder and the waterer. The major overlap in activity in these pens occurred in quadrat 2 of all decks and in quadrat 1 of the large decks at normal stocking density. Feeding and resting occurred simultaneously in these two quadrats and potentially interfered with each other.

Piglets consistently defecated in the back areas of all pens and away from the high-traffic areas, displaying good discrimination between resting and defecation areas.

Designation of the areas for resting and defecating appeared to be important to the piglets. Definite patterns for these behaviors were established within two days, indicating that any attempts to restrict or govern areas for resting or defecating must be done as soon as piglets are placed in weaner decks.

Feeding and drinking could only occur in the quadrats where food and water sources were located. Piglets did not establish any other strong location preferences for other behaviors, although when heat lamps were used, they did lie on their sides more frequently in quadrats 1 and 2 than in other areas.

### Effect of Pen Shape

Total space available in the small deck was used more uniformly than the space available in the wide or narrow decks at low or normal stocking densities. More activities occurred in the front half of all decks, but the back area of the small deck was used more frequently (38% of the time) than the back areas of the wide and narrow decks which were used only 31% and 22% of the time.

Although feed intake and feed efficiency were not related to pen shape, weight gain was. Piglets in small pens gained more rapidly than those in narrow or wide pens during the first two weeks. By the fourth week in the weaner decks, differences in body weight were not significant.

Effect of Age / Heat Lamp

Age of the pigs influenced their preferences for areas to lie on their sides and to rest. During the first week, pigs lay on their sides consistently in quadrats 1 and 2 but showed no location preference during the third week. Pigs rested in quadrats 1 and 2 of all decks. This preference was established early and did not change over time. Quadrats 1 and 2 were obvious choices for resting during the first week when the heat lamps were present. After the heat lamps were removed, it was expected that the pigs would change their location of resting to a low-traffic area. It is not clear why quadrats 1 and 2 remained the preferred areas for resting after the heat lamps were removed. Was it habit or did they choose to rest near the feeder and the action? More studies are required to determine why these pigs preferred to rest in the high-traffic areas.

Age also influenced the frequency of some behaviors in some decks. In small decks, pigs lay on their sides more frequently during the third week than during the first week. In wide decks, the frequency of play/fighting decreased from week 1 to week 3.

Effect of Time of Day

Pigs tended to eat more in the morning and rest more in the afternoon.

Effect of Stocking Density

Stocking density influenced choice of resting area of the piglets in the wide decks but not those in the narrow decks. In wide decks, as in narrow decks, pigs preferred to rest in quadrats 1 through 3. At the lower density 76.3% of the resting occurred in that area in wide decks whereas at the normal density only 49.8% of the resting occurred there. The space outside the preferred area in wide decks may have been perceived by the pigs to be more similar to quadrats 1 through 3 and hence chosen more often than was the case in narrow decks.

Density affected the frequency of uncategorized behavior. These behaviors were observed more frequently in the low density pens (12.4%) than in the normal density pens (8.5%). Pigs in narrow pens lay on their sides more often at low density (7.7%) than at normal density (4.5%). More play/fighting was observed in the normal density pens (7.7%) than in low density pens (2.0%) during the second hour after weaning. This was likely due to greater aggressive behavior usually associated with mixing piglets from two litters.

Stocking density had no effect on patterns of defecation, indicating that recommended stocking density allows for normal

defecation habits.

Weight gains were similar in narrow and wide pens at normal density. Lowering density increased the intake and weight gains of pigs in wide pens but not in narrow pens.

Location of Water

Moving the waterer adjacent to rather than opposite the feeder did not change its location from quadrat 3 in the small and wide pens. The waterer in the narrow pen was moved from quadrat 7 to quadrat 3. Moving the waterer changed the preferred resting place in the narrow pen. When the water was located at the rear, quadrats 1 and 2 were used equally for resting (11.2% and 11.3%), followed by quadrat 3 (8.4%). When the waterer was moved to quadrat 3, quadrat 1 was preferred (13.3% of the resting), followed by quadrats 2 and 4 (7.1% and 6.8%). The presence of water reduced the acceptability of an area as a resting site even on perforated flooring.

Pigs housed in narrow pens drank more often when the waterer was located in quadrat 3, adjacent and closer to the feeder. Feed consumption increased when the water was moved closer to the feeder.

Pigs did not defecate preferentially near the waterer. General practice has been to place water at the rear of weaner pens to encourage piglets to defecate and urinate in that area. There was no evidence to suggest that piglets defecate where water is located when they are housed in weaner decks with totally slatted floors.

CONCLUSIONS AND IMPACT

Four recommendations for deck design can be made from these results:

At the recommended density, two heat lamps could create a larger preferred resting area than one lamp. Locating heat lamps outside of the feeding area may help create a resting site away from the high traffic area. Further studies are needed.

Attempts to control where resting areas are established must be made early because piglets do not seem to change their preferences.

Putting water near the feeder may discourage resting near the feeder and create a less disturbed site. In some cases feed consumption could increase.

Defecation sites will not likely be located near waterers and will be chosen furthest from the feeding and resting areas. Pigs like their privacy.

# THE EFFECT OF FRESH FEED ON INTAKE OF WEANLING PIGS

J.A. de Gooijer and G.I. Christison

## ABSTRACT

This feeding trial was conducted to determine the effect of offering fresh feed daily on post-weaning feed consumption and consequent gain by weanling pigs. The removal of stale feed and its replacement by fresh feed every day did not improve feed consumption during the first week, or over all four weeks, of the feeding trial. Pig performance was appreciably better when fed a commercial diet rather than a home mixed one.

## BACKGROUND AND OBJECTIVES

A problem producers face with newly weaned pigs is poor feed intake. If severe enough, this can lead to stragglers and even deaths. A more common problem is that pigs eat too little for a few days then overeat and suffer from nutritional diarrhea. Making the starter feed more attractive should be a priority to help get weanling pigs off to a good start. One factor which may be involved is the introduction of fresh feed into the feeders every day.

The objectives were to determine the effect of offering fresh feed daily on post-weaning feed consumption and consequent gain in weanling pigs.

## EXPERIMENTAL METHODS

Thirty two litters of 7 to 9 pigs newly-weaned at 28 days were randomly assigned to one of the four feed treatments for 26 days. The two diets used were: a good commercial crumble and a home-mixed meal which was composed of rolled oats and soybean meal with vitamins and minerals. Each of these diets were either fed fresh or stale. The fresh feed was stored in sealed bags in the feed room near the barn's main entrance while the stale feed was left near the weaner room where the barn odors were much stronger. The fresh feed was vacuumed out of the feeders and replaced each day while the stale feed was added to the feeders several days before it was likely to be eaten and was not replaced.

Weight gain and feed intakes were recorded on a weekly basis for all the litters. During the first 12 days of the trial, daily feed intake records were kept for 4 litters on both of the fresh diets.

To determine digestibility, chromic oxide was added to the two diets and several pigs were tested on each of them. Fecal samples were collected twice daily for 3 days during week 1 and again during week 4 of the trial and analyzed using laboratory techniques to allow the calculation of dry matter digestibility.

## RESULTS AND DISCUSSION

On a daily basis, intake of fresh feed was variable from litter to litter but there was no difference between diets until about 10 days post weaning when a noticeable increase occurred in the commercial diet (Table 1).

On a weekly basis, the stale commercial diet had a non-significantly higher intake during the first week (Table 2). This trend continued throughout the 26 day trial. Over the entire test period the commercial diet had a significantly higher intake than the meal diet. Daily gain and feed efficiency were also both significantly ($P<.05$) better on the commercial diet over the whole period. There was no indication that freshness played any role in affecting any of the variables measured.

During the first week of the trial there was a marked difference in digestibility between the two diets (Table 3) with the meal having about 10 percentage units higher digestibility for dry matter, energy and protein. Over the next three weeks, the digestibility of the commercial diet increased somewhat. None of these differences are clearly related to the patterns of intake of the diets.

## CONCLUSIONS AND IMPACT

The removal of stale feed and its replacement with fresh feed every day did not increase feed consumption during the first week after weaning, or at any time, with either diet. The average daily intake and gain in the first week was unaffected by the various feed treatments.

The commercial crumble diet (whether fresh or stale) was eaten in greater amounts by weanling pigs after the first 10 days than the home-mixed meal diet. Pig performance was appreciably better when fed a commercial diet. Producers should therefore use good commercial starters because they are more economical than home mixed starter diets.

Although these results show no benefit from replacing feed daily, producers should continue to ensure that feeders are not contaminated with urine or manure and that feed in the feeders is not stale.

Table 1. Daily intake (g/d) during the first twelve days post weaning of pigs fed two fresh diets.

| Diet | Day: 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Commercial | 156 | 174 | 173 | 186 | 208 | 214 | 287 | 347 | 379 | 445 | 476 | 529 |
| Meal | 138 | 166 | 152 | 212 | 206 | 247 | 232 | 307 | 402 | 483 | 411 | 457 |

Table 2. Performance of pigs fed two fresh or stale diets.

| | Fresh | | Stale | | |
|---|---|---|---|---|---|
| | Commercial | Meal | Commercial | Meal | SEM |
| 1-6 days post weaning | | | | | |
| Gain, g/d | 113 | 60 | 114 | 99 | 14 |
| Intake, g/d | 167 | 162 | 185 | 162 | 9 |
| Gain/feed | .73 | .41 | .61 | .60 | .08 |
| 1-27 days post weaning | | | | | |
| Gain, g/d | 390 | 298 | 381 | 305 | 13 |
| Intake, g/d | 567 | 490 | 574 | 489 | 18 |
| Gain/feed | .69 | .61 | .67 | .62 | .01 |

Table 3. Digestibilies (% DM) of two diets at two ages.

| Diet | Age, days | Dry matter | Gross energy | Crude protein |
|---|---|---|---|---|
| Commercial crumble | 35 | 75.9 | 74.0 | 67.1 |
| | 56 | 79.8 | 75.1 | 79.5 |
| Home-mixed meal | 35 | 84.9 | 83.8 | 75.5 |
| | 56 | 85.4 | 84.8 | 77.6 |

Agricultural Development Fund

Project #R-86-01-0068

"Management of Weanling Pigs"

Personnel Distribution Listing

| | | % |
|---|---|---|
| D. Francis | Graduate Student | 100 |
| M. Tremblay | " " | 100 |
| F. Teitge | Student Assistasnt | 25 |
| B. Hill | Herdsman | 80 |
| J. DeGooijer | Technician | 100 |

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UNIVERSITY OF SASKATCHEWAN
Saskatchewan Agriculture
"Management of Weanling Pigs to Minimize Environmental and Social Stress"
Under the Direction of D.A. Christensen, Animal & Poultry Science
Statement of Receipts & Expenditures for the Period
July 16, 1986 - February 28, 1987

| | | |
|---|---|---|
| **Receipts** | | |
| Saskatchewan Agriculture - September 1986 | | $49,000 |
| **Expenditures** | | |
| Salaries | $37,219 | |
| Fringe Benefits | 2,075 | |
| Materials & Supplies | 595 | |
| Travel | 128 | 40,017 |
| Unexpended Balance as of February 28, 1987 | | $ 8,983 |

PROJECT DIRECTOR

(Ms.) C.M. BOYER
RESEARCH ACCOUNTANT

Agricultural Development Fund

Project #R-86-01-0068

"Management of Weanling Pigs"

Financial Projection to March 31, 1987

| | |
|---|---|
| Salaries and Fringe Benefits | $28,000 |
| Materials and Supplies | 1,000 |
| | $29,000 |